

# Public Infrastructure Stormwater

Water Services



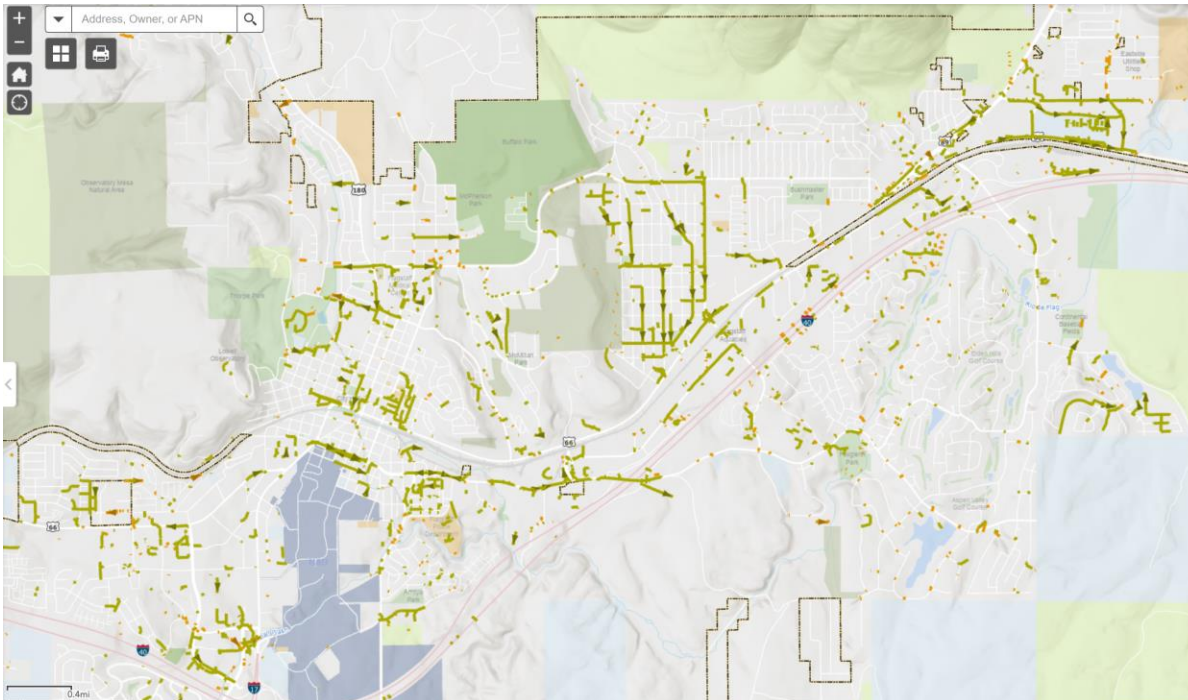


# Stormwater Overview

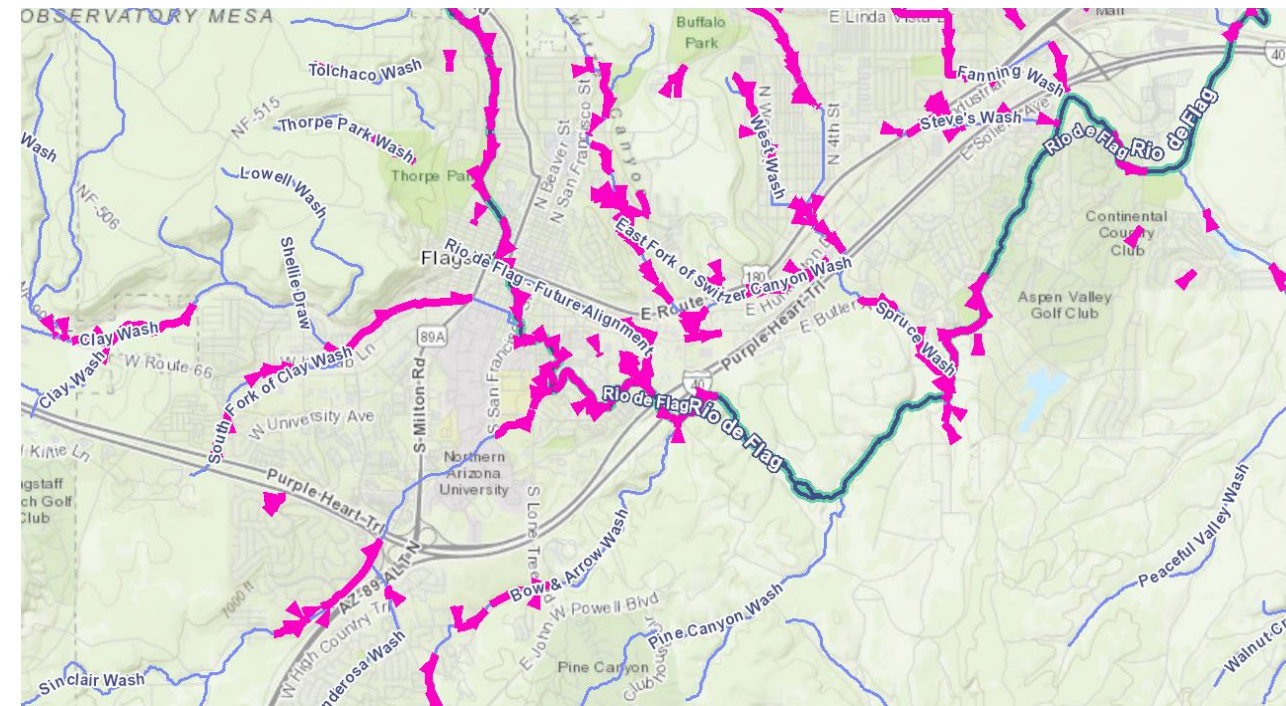


Water Services' Stormwater Section manages and maintains 28 miles of major streams and washes, over 120 miles of smaller channels, thousands of catch basins and several miles of underground piping to provide drainage and mitigate flooding within Flagstaff

Stormwater pipes, tunnels, and underground storage



Watershed channels-blue, City maintained reaches-pink





# Stormwater Maintenance



- Stormwater systems require regular maintenance, separated into programs addressing above and below ground channels:
  - **Closed Channel Maintenance:**
    - Keeping underground infrastructure (culverts, storm drains, and manholes) free of debris and flowing properly
  - **Open Channel Maintenance:**
    - Clearing above ground channels to mitigate flood risk





# Stormwater Funding

Stormwater funding is a utility rate fee based on a parcel's calculated impervious surface.

- Current stormwater utility rate fee was last adjusted in 2018.

## **Fees cover:**

- Rio de Flag Flood Control Project (RDFFCP), to capture payback on \$54 million in bond debt
- Approximately \$1 million annually in capital projects outside of the RDFFCP Project
- Core staffing and minimal maintenance program
  - Rates have not been adjusted for the 2019 Museum Fire impacts or for climate change.



# 2021 Flood Events

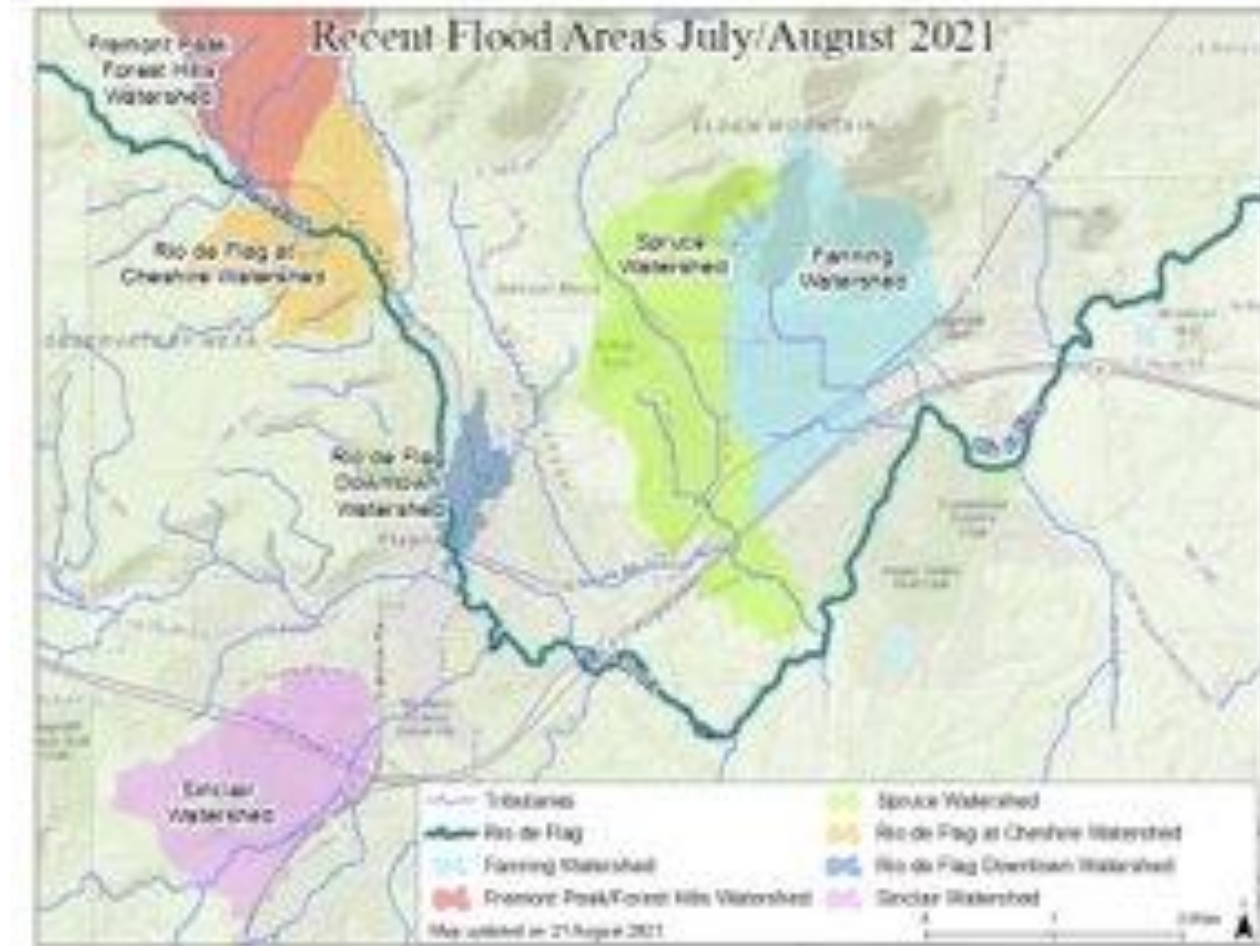


The 2019 Museum Fire burned 1,961 acres on Mount Elden/Dry Lake Hills, north of Flagstaff.

➤ No significant monsoon until Summer 2021

**2021 Flood Response** Est cost: \$1.8M/year

- Four (4) large flood events Summer 2021 in the Museum Fire scar area – primarily in the **Spruce Watershed**
- Rare 200-year precipitation event over Mount Elden incised mountain drainage channels, increased future flood risk, exacerbated existing stormwater issues in **east Flagstaff**.
- Two other 2021 floods in University Heights- **Sinclair Watershed** and Cheshire- **Rio de Flag at Cheshire** and **Forest Hills Watersheds**





# Scope of Projects – Bond Request

This request focuses on greatest need in **Spruce Watershed**. These projects are dependent on each other to create the best future outcomes. Adding capacity in one area must be balanced with corresponding capacity in another area to work properly.

• Spruce Channel Master Plan	\$ 100,000
• Linda Vista Culvert improvement	\$ 1,200,000
• Cedar Avenue culvert improvement	\$ 1,200,000
• Dortha Inlet improvement	\$ 1,500,000
• Arroyo Seco diversion through Ponderosa Park	\$ 1,400,000
• Killip School Detention Basin	\$ 3,000,000
• Channel improvements (box culverts throughout the system)	\$ 12,000,000
• South Mount Elden detention and diversion structures	\$ 2,000,000
<b>TOTAL</b>	<b>\$22,400,000</b>





# Linda Vista Culvert Improvement



- **History** – Initial improvements completed in 2020, recent flooding events show necessity for increased capacity.
- **What** – Increasing the capacity of culvert under Linda Vista Drive to mitigate flooding on Grandview and into Sunnyside neighborhoods.
- **Status** – Peak Engineering conducting studies of current design and alternatives.



Estimated cost \$1,200,000





# Cedar Avenue Culvert Improvement



- **History** – Culvert at Cedar Ave does not have sufficient capacity to convey small flood events.
- **What** – Increasing the capacity of culvert under Cedar Avenue to allow flow to remain within the channel.
- **Status** – Peak Engineering is conducting studies of current design and alternatives.



Estimated cost \$1,200,000





# Dortha Inlet Improvement



- **History** – Existing 60" pipe installed circa 1960's. Does not accommodate post Museum Fire flood flows.
- **What** – New 12' x 8' single barrel box culvert crossing Dortha Avenue and an open channel box storm drain to capture localized drainage from adjacent properties. Construction and installation is anticipated for April to June 2022.
- **Status** – Design by Shepherd-Wesnitzer, Inc (SWI).



Estimated cost \$1,500,000





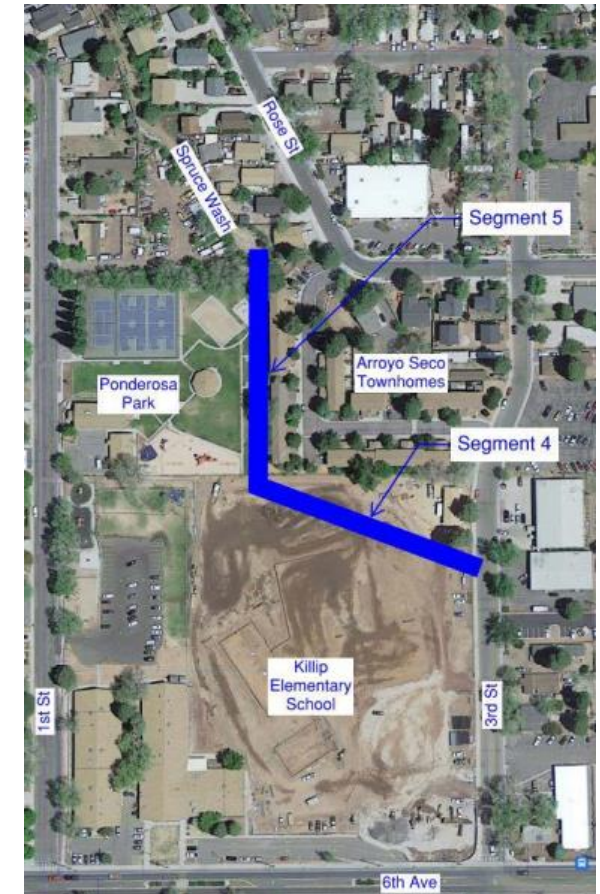
# Arroyo Seco Diversion through Ponderosa Park



- **History** – There is an existing 60" pipe under Arroyo Seco Townhomes designed to a 100-year flood (pre-fire).
- **What** – Adding a storm diversion beginning at the Arroyo Seco inlet that feeds into the new Killip Regional Detention Basin
- **Status** – Studies and design underway (SWI Engineering).



- Estimated cost \$1,400,000

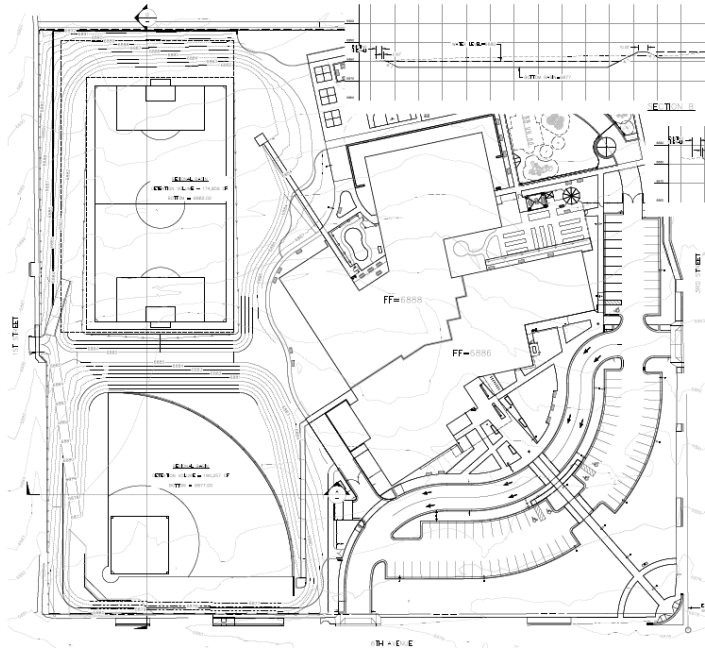




# Killip School Regional Detention Basin



- **History** – Killip School sits along Spruce Wash and was flooded in 2021 flood events. Killip School was already undergoing a relocation, which allows for the development of these basins.
- **What** – Killip School footprint has capacity for basins to reduce the risk of flooding into residential areas. Two, 4-foot-deep detention basins, in series (upper and lower), will hold 11 acre-feet of stormwater runoff from Spruce Wash. This project includes outlet pipe.
- **Status** – Shepherd-Wesnitzer Inc. (SWI) design, with construction by Core Engr under a FUSD contract. Construction has begun (January 2022).



Estimated cost \$3,000,000



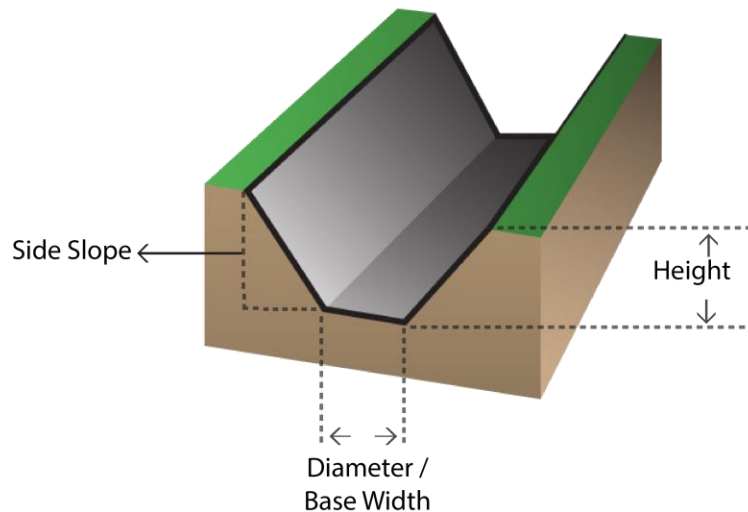


# Spruce Wash Channel Improvements



- **History** – The entire Spruce Wash channel will need to be widened and reinforced to mitigate future flood events.
- **What** – A series of underground boxes/tunnels, possibility of some open channel reaches that increase capacity to mitigate existing conditions.
- **Status** – Studies and design underway (Peak Engineering, JE Fuller Hydrology).

Trapezoidal Channel



Estimated cost \$12,000,000

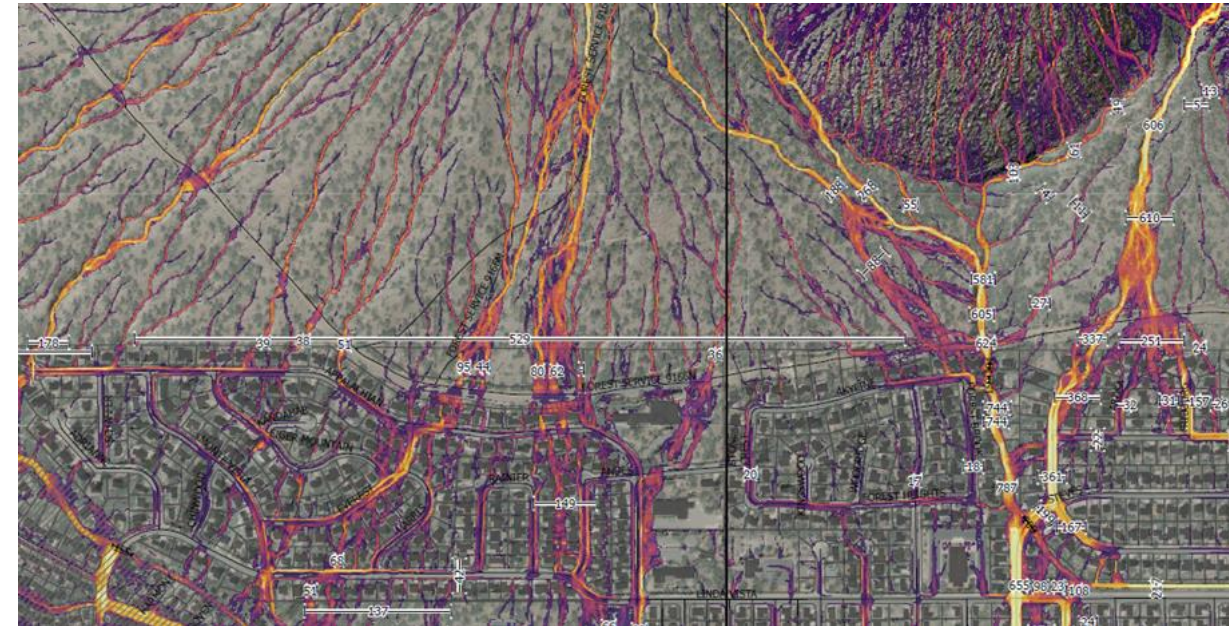
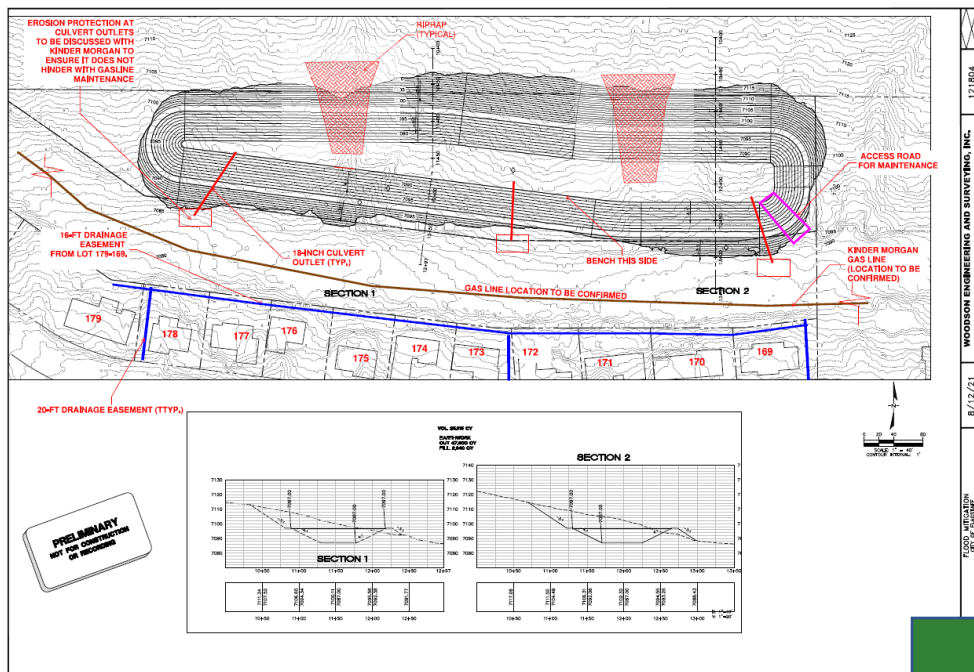




# South Mount Elden Detention and Diversion Structures



- **History** – Significant flooding occurred in residential areas directly south of Mount Elden.
- **What** – A significant rain event caused flooding but also incised drainages on Mount Elden making future flood events more likely. A portion of the slopes drains to the Museum Fire area.
- **Status** – Conceptual designs were provided to the City. Discussions with Kinder Morgan, landowner of (natural gas pipeline) in that area are ongoing.



Estimated cost \$2,000,000



# Community Impacts, if Unaddressed



- Without stormwater mitigation and infrastructure:
  - Increased flood damage **will** occur (2010 Schultz Fire watershed has still not recovered)
    - Infrastructure damage
    - Property damage
    - Erosion and degradation of natural areas
    - Increased financial strain (No action in Museum Flood area could cost \$15-\$25 million over next ten years)
  - Reduced quality of life for the community
  - Water quality/public health could be negatively impacted
  - Loss of community trust
  - Non-compliance with FEMA, state, and local regulations





# Council Goals & Objectives



- ***PBB Key Community Priorities & Objectives***

- Safe & Healthy Community
- Sustainable, Innovative Infrastructure
- High Performing Governance

- ***Regional Plan Goals***

- Environment & Conservation – Goal E&C.2, 3, and 4 and associated policies, Policy E&C.10.6
- Energy - Policy E.1.12
- Environment and Conservation – Policy E&C.9.1(County policy)
- Water Resources – Goal WR.2, Policies WR.2.1, and 2.2, Policy WR.3.4, Policy WR.3.6, Goal WR.4, Policy WR.6.1 and Goal WR.6

# Questions?

